

Standard Offer, Renewable Energy Credits & Ryegate

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Overview

- Renewable requirements in Vermont
- Standard Offer
- RECs: A mechanism to enable regional trading
 - What are RECs?
 - Why are RECs important?
 - How do RECs work?
- REC pricing
- PSD Perspective on S.1

History of Renewable Requirements

- 2005 – Sustainably Priced Energy Enterprise Development (SPEED) Program
 - Required utilities to enter into long-term stably priced contracts for renewable resources
 - Did not require retirement of RECs
- 2009 – Standard Offer Program
 - Created a single, statewide procurement process for small (2.2 MW or less) renewable resources
 - Initially 50 MW, expanded to 127.5 MW in 2012
 - Initially, administratively determined price, moved to reverse bid process in 2012
 - Did not require retirement of RECs
- Net metering
 - 2008 – allowed group net metering, expanded overall cap from 1% to 2%; increased project size cap to 250 kW
 - 2011: Project cap expanded to 500 kW; registration process for small systems begins; overall cap expanded to 4%; solar adder introduced
 - 2014: Cap expanded to 15%; NM 2.0 process initiated
 - 2017: NM 2.0 starts; compensation based in part on whether RECs are given to utility
- 2017- Renewable Energy Standard
 - 3 Tiers of requirements that increase annually: Total Renewables, Distributed Generation, & Energy Transformation

STANDARD OFFER

Standard Offer Program

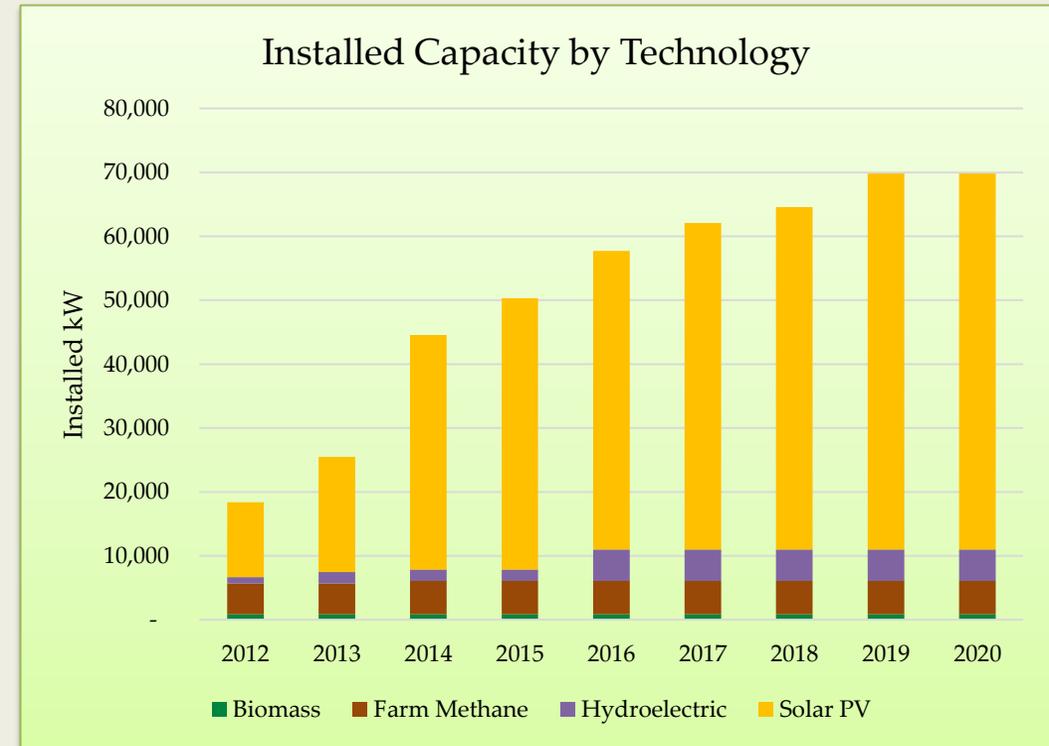
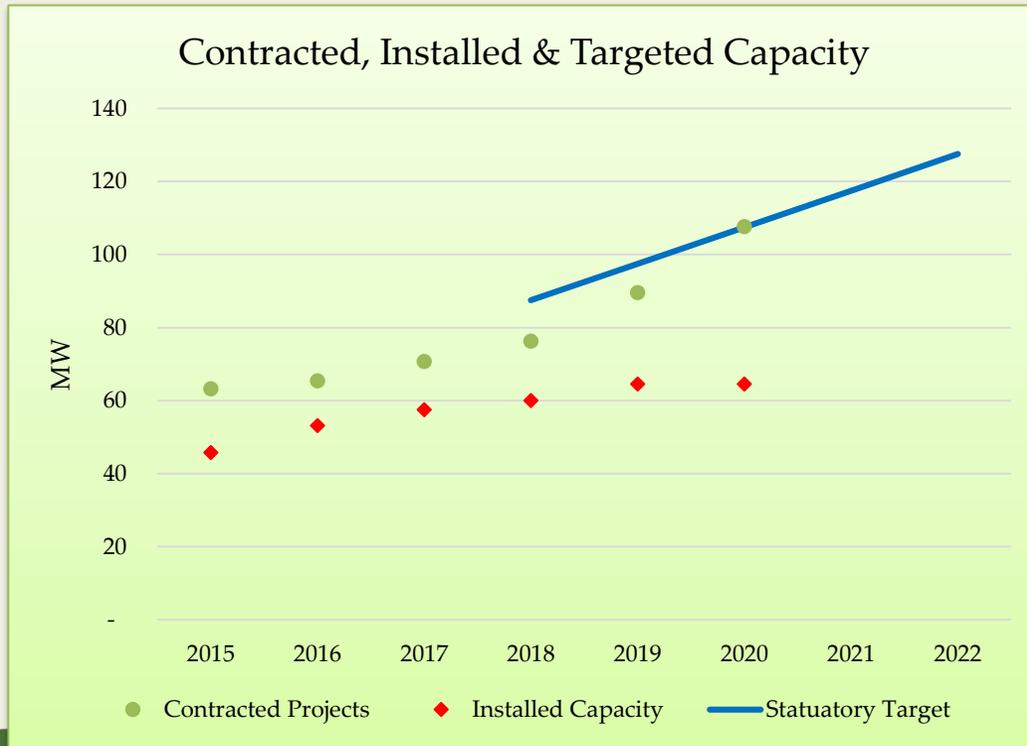
- Program was established in 2009 to stimulate small, in-state renewable energy development
- Total program capacity of 127.5 MW expected to be contracted by 2022
- Program is structured to encourage technology diversity, but has proved hard to achieve
- Currently, there are 70 MW online with a total of 113 MW that have been awarded contracts
- In 2020, the program cost was \$22.3 million, for an average price of \$199/MWh
 - The average cost per MWh has been decreasing as new contracts are awarded at more competitive prices

→ *The PSD recommends phasing out the program as soon as practical due to unnecessary wheeling costs, concerns regarding system impacts, the unpredictability of online dates, litigation costs, and the administrative costs and burden*

Standard Offer Historical Performance

Year	Annual Generation (MWh)	Annual Program Cost	Average Price per MWh	Installed Capacity (MW)
2015	90,126	\$ 20,100,371	\$ 223	51
2016	101,377	\$ 22,042,023	\$ 217	58
2017	103,519	\$ 21,342,884	\$ 206	63
2018	103,658	\$ 21,250,884	\$ 205	65
2019	109,516	\$ 21,991,994	\$ 201	70
2020	112,185	\$ 22,273,981	\$ 199	70

Standard Offer Program Details



RENEWABLE ENERGY CREDITS

ISO-NE

- Responsible for balancing load and generation in New England on real-time basis
- There cannot be excess generation or underserved load
 - Imports into the region result in reduced need for generation within the region or increased exports out of the region

Renewable Requirements

- States set policy regarding the amount, type and pace of renewable requirements, often with a *Renewable Portfolio Standard*
- RECs are a market mechanism that enable the tracking and trading of renewable attributes
- Renewable resources must be delivered into New England in order to be eligible

New England Renewable Requirements

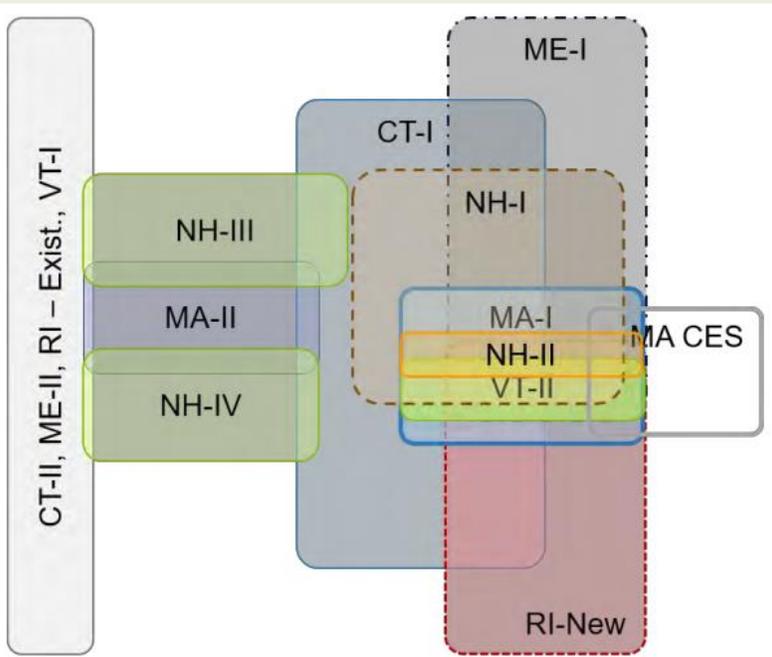
Table 1: Technologies to Meet State RPS

Common Technologies	State	Special Technologies or Restrictions
Solar thermal, photovoltaic, ocean thermal, wave, tidal, wind, biomass (MA: subject to eligibility requirements), small hydro, landfill gas, fuel cells	Maine	Municipal Solid Waste (“MSW”) with recycling, cogeneration, and geothermal, “useful thermal energy”
	Massachusetts	Fuel cells only with renewable fuels, MSW
	Connecticut	Hydro <5 MW, sustainable biomass, MSW, fuel cells, energy efficiency and combined heat and power (“CHP”), large-scale hydro (only if shortfall in Class I resources, capped at 5% in 2020)
	Rhode Island	Fuel cells only with renewable fuels, geothermal
	Vermont	Agricultural wastes
	New Hampshire	Geothermal, no fuel cells

- Each state decides amount, type, and pace of renewable resource procurement
- Generally, there is large degree of commonality in what resources are eligible

Source: New England States Committee on Electricity, Mechanisms to Support Public Policy Resources in the New England States, December, 2015.

New England Renewable Requirements



VT Tier I (existing):

- Total renewables requirement
- Broad eligibility, similar to Maine-II, Connecticut-II, and RI-Existing + unique to VT Tier I: Hydro-Quebec attributes

➔ supply of VT Tier I resources > supply of other existing renewable requirements

VT Tier II (premium):

- Narrow eligibility requirements: capacity < 5MW, commissioned after 6/30/2015, and in Vermont
- VT Tier II resources are a small subset of regional premium REC resources, whereas premium RECs in other states include larger resources with online dates prior to 2015.

Source: Green Mountain Power 2018 Integrated Resource Plan

RES Compliance

- RECs are used to demonstrate annual compliance
- By August 31, utilities submit a compliance report showing:
 - Annual retail sales (kWh)
 - RES requirement
 - RECs retired
- RECs are associated with the calendar year that the energy was generated, called “vintage”

What is a Renewable Energy Credit (REC)?

- The environmental attribute associated with a MWh of generation by a qualified renewable resource
- Energy (MWh) and attributes (RECs) can be separated and traded independent of each other
- Each MWh of energy generated in New England has an associated environmental attribute



ENERGY: power is generated and sent to the grid or used to offset customers' electricity usage. ISO-NE operates and manages the energy market in New England--the origin and destination of the energy are not tracked.

RECs: the environmental attributes associated with the generation. NEPOOL GIS is the platform in New England where RECs are created, traded and retired.

Why do we need RECs?

- RECs are the tool used for accounting, tracking and assigning ownership of renewable attributes.
 - Creates fungible commodity that can be traded
 - Creates uniform system for ensuring that there is no double counting
 - Allow for the transfer and tracking of ownership in NEPOOL GIS
- The ownership of a REC provides the right to claim the associated renewability.
- RES compliance is demonstrated through REC retirements.

How do RECs work?

- An eligible renewable resource can qualify its generation in different states such that attributes associated with that resource receive a “REC” designation.
 - Attributes from one resource may be qualified RECs in multiple states
- When a MWh of energy is generated by a qualified resource, a corresponding REC is “minted” in NEPOOL GIS.
- Certificates can be transferred between counterparties or retired for compliance and/or voluntary purposes, but certificates CANNOT be duplicated.
- RES compliance can be met by purchasing RECs and does not require the physical energy from the renewable resources.

What is REC trading?

- REC trading is the transfer of ownership of RECs
- REC market participants include utilities with compliance obligations, generators and speculators
- Trades can be direct (between two counterparties), arranged by a broker, through an auction, or an RFP
- Trades can range from short-term RECs only purchase for immediate delivery to long-term (20+ years) bundled Purchase Power Agreements for energy, capacity, RECs and other products.

NEPOOL GIS

The NEPOOL GIS issues and tracks certificates for all MWh of generation and load produced in the ISO New England control area, as well as imported MWh from adjacent control areas.

Regulators, such as the PSD, have access to reports in NEPOOL GIS to verify utility compliance

For each resource, NEPOOL GIS tracks several attributes, including:

- * Plant Name
- * GIS Unit ID
- * Facility location
- * Project vintage (build date)
- * Certificate unique identification number
- * Project name
- * Fuel type
- * Nameplate capacity of project
- * Certificate (generation) vintage
- * RPS/ RES eligibility

REC Pricing

- Theory: REC price = Cost to build RE – market revenues (energy, capacity, ancillary services, etc.)
- Reality: REC prices are determined by supply and demand
- Different Tier/Class eligibility means different values
- Similar markets tend to have similar pricing
 - VT Tier I, ME-Existing, RI-Existing all currently trade \$0.50 - \$2/REC
 - VT Tier II, CT-I, MA-I, NH-I, & RI-I all currently trade \$40/REC
- REC markets are volatile-- the commissioning or delays of large resources or changes in requirements can have a significant impact on supply and demand and result in large price swings

Historical Prices



Source: GT Environmental REC Brokers

REC Arbitrage

Arbitrage: the near-simultaneous buying and selling of commodities in different markets in order to take advantage of different prices for the same or similar assets.

REC arbitrage occurs when RECs from one project are sold and replaced by less expensive RECs from another project.

A VERMONT EXAMPLE

Project	Kingdom Community Wind
Owners	Vermont Utility Owned- GMP & VEC
Location	Lowell, VT
Commissioning Date	November 2012
Type	Wind
Size	63 MW
REC Qualifications	VT Tier I, CT-I, MA-I, MA CES, RI-new
Class I REC price (v18)	max: \$45/ REC; min: \$3/REC
VT Tier I cost	avg reported 2018 cost: \$0.50/REC

Generation in 2018 was 160,500 MWh. Utilities could (1) retire or (2) sell the RECs.

(1) Retirement for Tier I compliance: value = \$80,250

(2) Sell into the MA, CT, or RI REC markets:

REC revenue = $160,500 \times \$23/\text{REC} = \3.7M

Tier I expense = $160,500 \times \$0.50/\text{REC} = \$80,250$

→ Net benefit = \$3.6M

RYEGATE

In-State Renewable Resources

- 400 MW Solar PV
- 200 MW In-state hydro
- 150 MW Wind
- 70 MW Biomass
- 11 MW Landfill gas
- 5 MW Methane Digesters

Electricity Products from Ryegate

- Energy
 - Baseload production provides consistent source of renewable electricity
 - Energy prices tend to be low except during cold weather
- Capacity
 - Plant has a high capacity factor and rating in ISO-NE Forward Capacity Market
 - Regional capacity prices continue to be fairly low
- Renewable Energy Credits
 - Plant produces high value RECs
 - There can be considerable volatility in regional REC prices

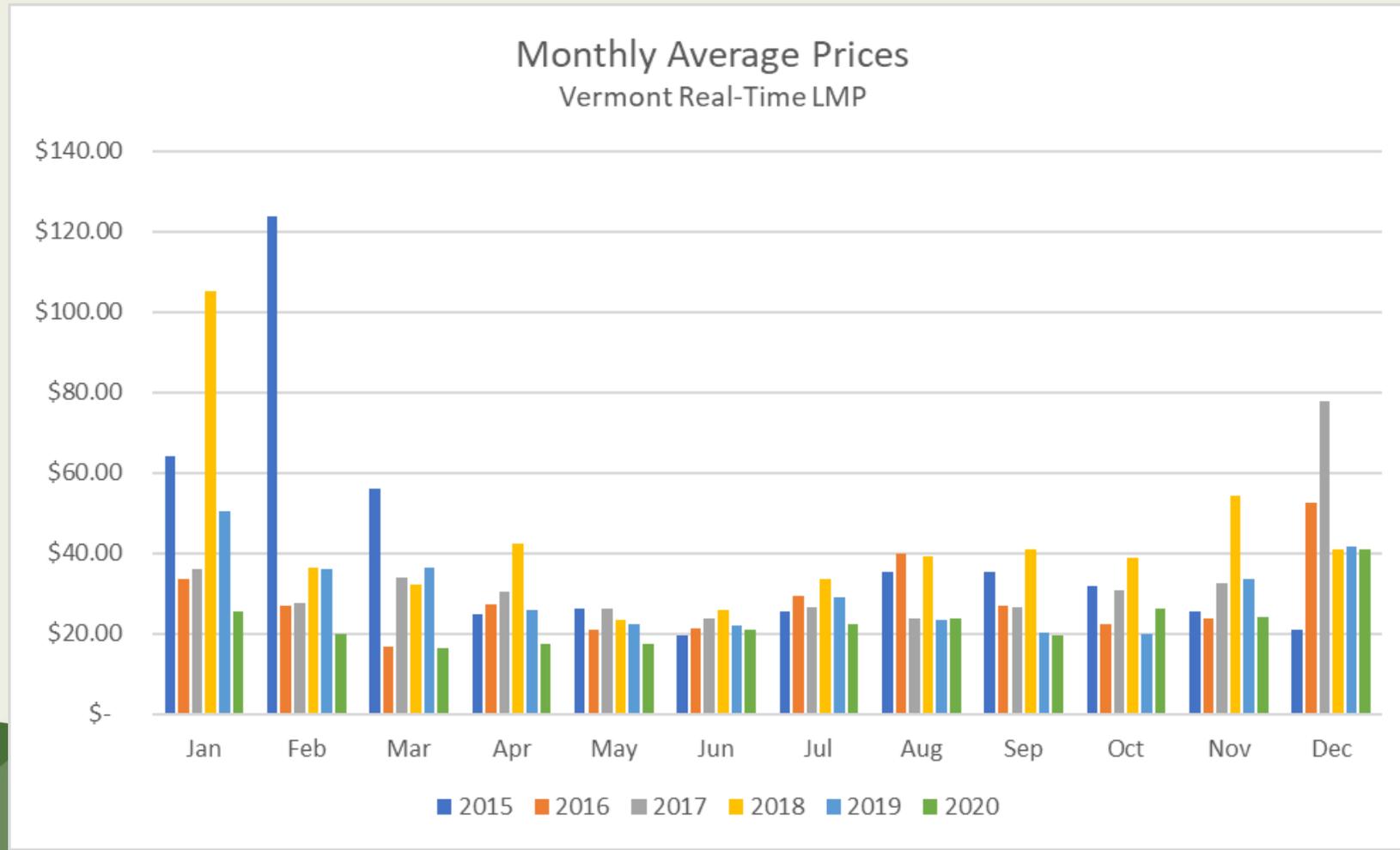
Ryegate Costs vs. market prices

Estimated 10-year levelized market prices

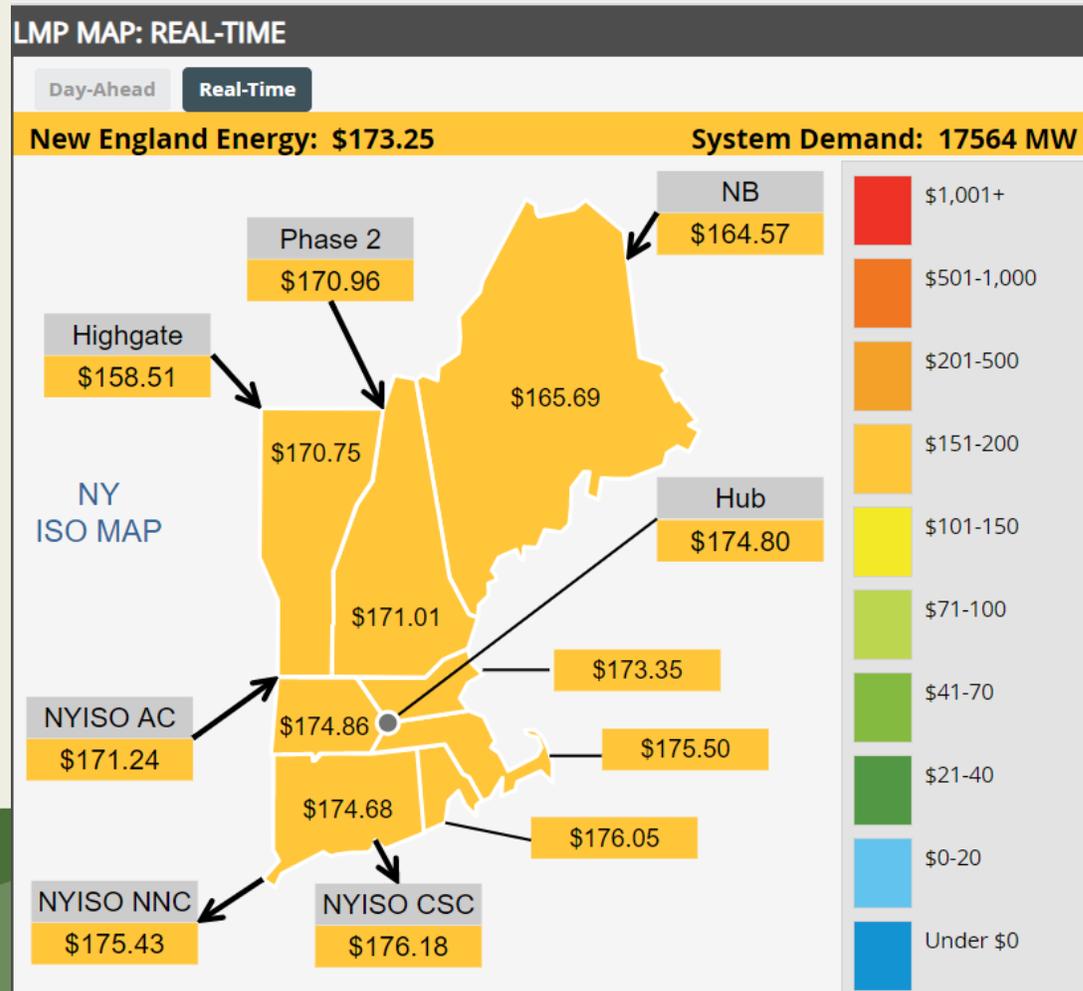
Energy	\$37.80	\$/ MWh
Capacity	\$4.79	\$/MWh
RECs (Class I)	\$31.50	\$/MWh
Total	\$74.09	\$/MWh

Ryegate's
existing contract
price:
\$103/MWh

New England Wholesale Energy Prices



Cold weather and Wholesale Energy Prices

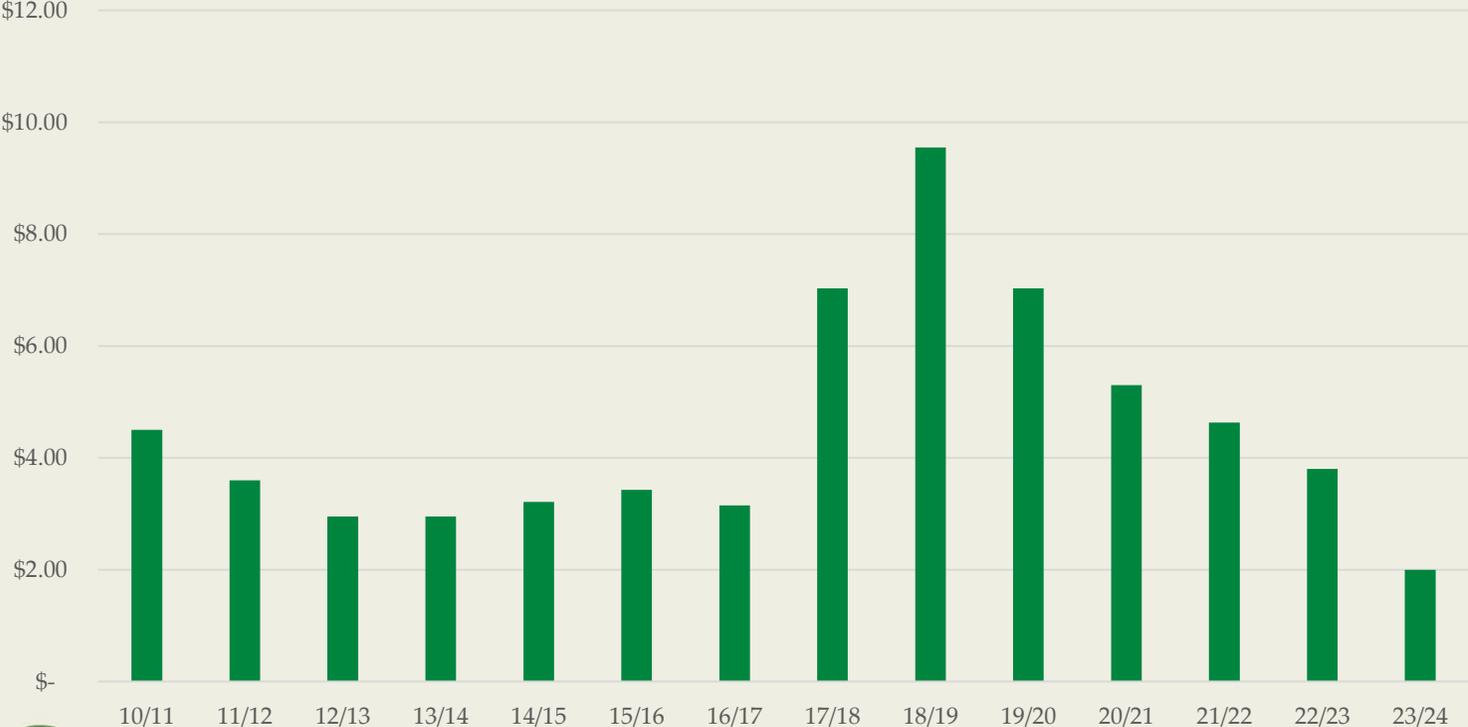


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9:55 am
ISO-NE Express

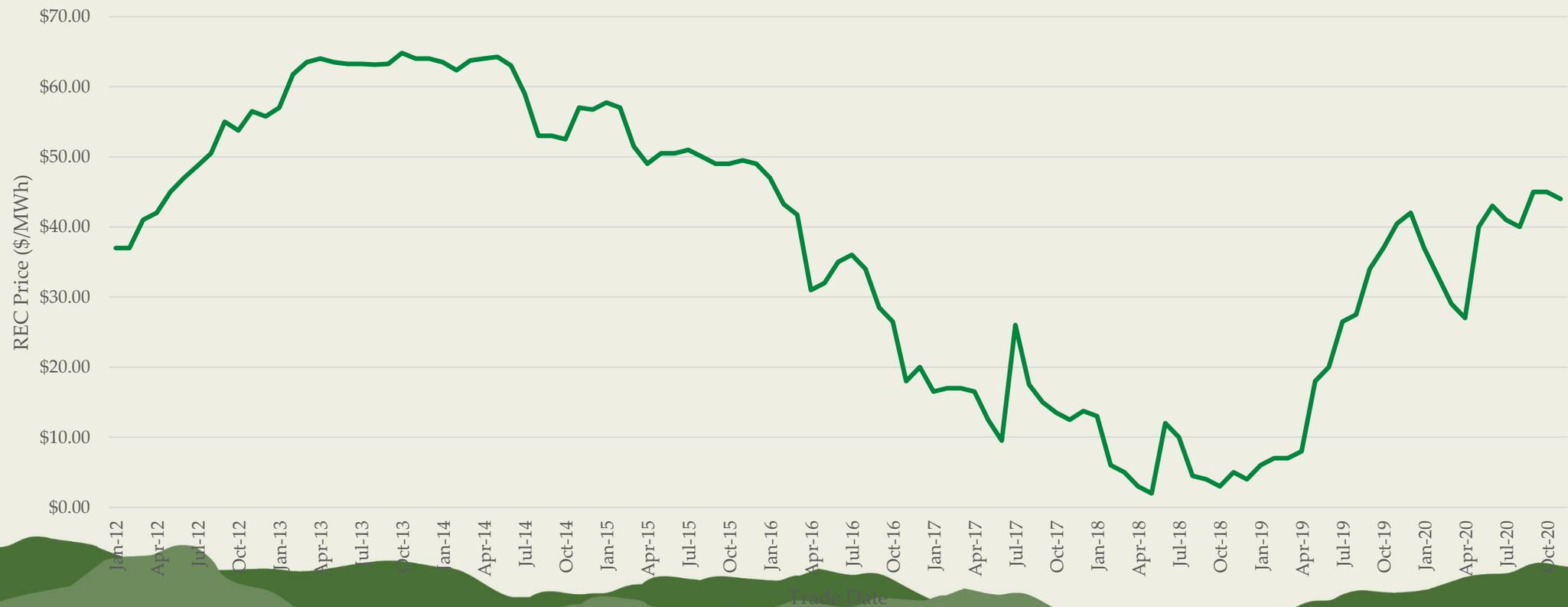
8 degrees in Boston and
Hartford
7 degrees in Montpelier

New England Capacity Prices

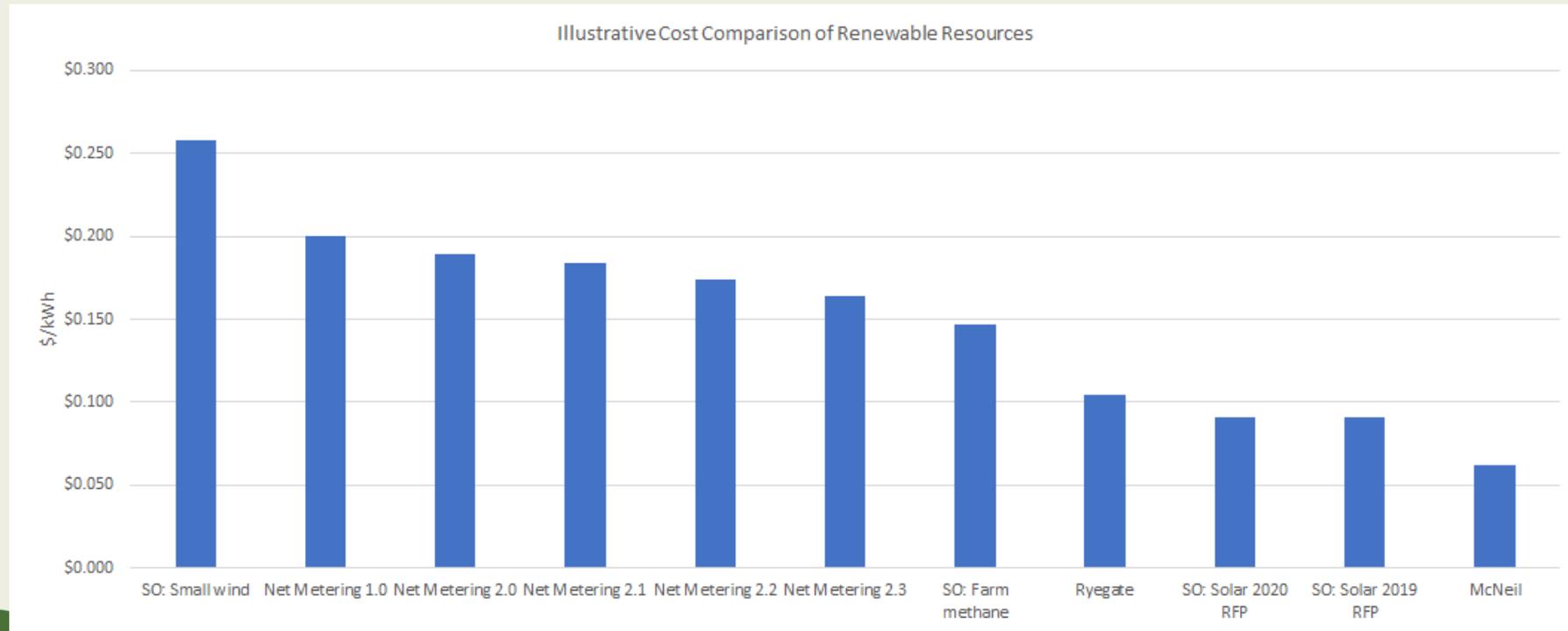
FCA Prices (\$/kW-month)



MA Regional Class I REC Prices



Cost Comparison of Renewable Resources



Ryegate Costs in perspective (2019)

Resource	MWh	Total dollars	Average \$/kWh
Ryegate	130,866	\$13,322,497	\$0.102
Standard Offer	112,185	\$22,273,981	\$0.199
Net Metering	278,088	\$56,958,854	\$0.205

Questions?

Additional information can be found in the PSD's

[2021 Annual Energy Report](#)

Appendix E: Report on the Renewable Energy Standard